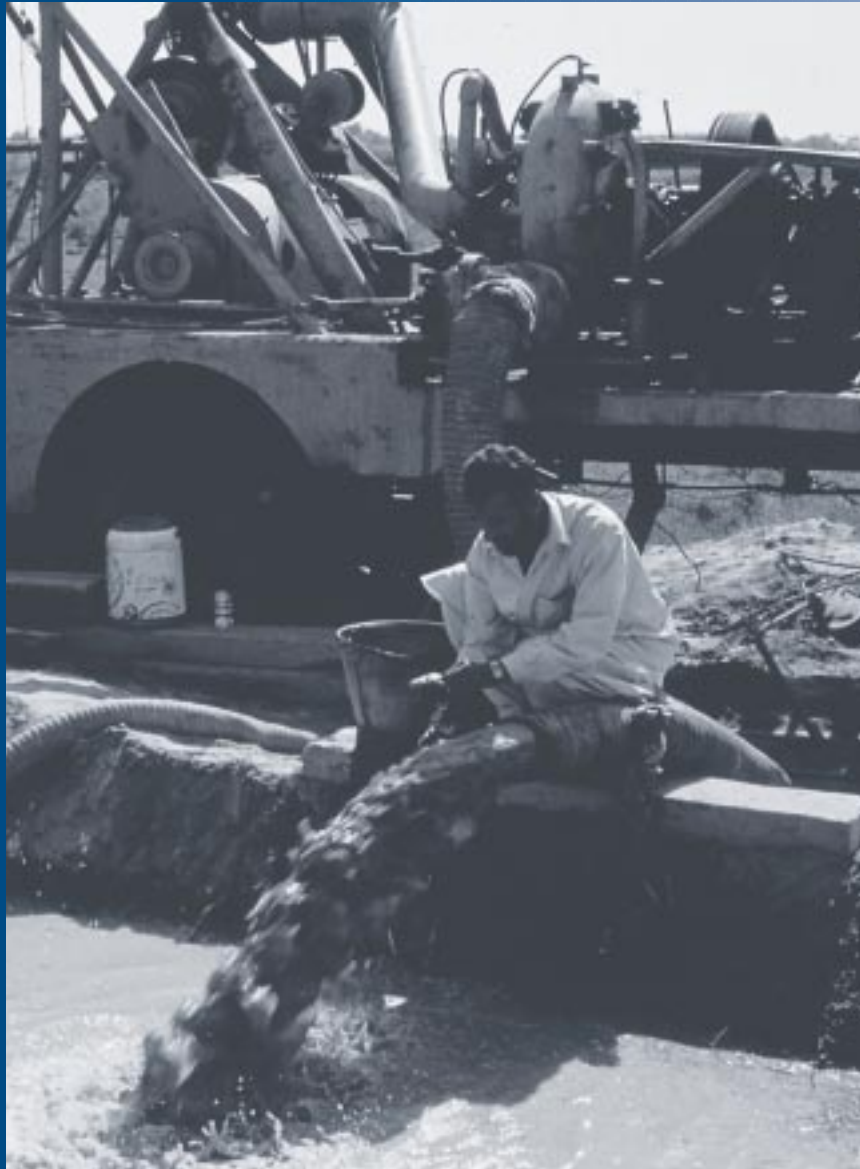


# Glossary of key concepts

## Chapter 12

# 12

Explanations of key water-related technical terms in current usage, many of which are central to the application of the strategic approach. Some are treated at greater length in Chapter 13.





## Chapter 12

### Glossary of key concepts

Appropriate modern technology  
Awareness raising  
Basic needs/Basic services  
Beijing Global Platform for Action  
Capacity building  
Clean technology  
Communications techniques  
Decentralised co-operation  
Demand management  
Economic and financial analysis  
Ecosystem management  
Environmental analysis  
Environmental economic valuation  
Environmental sanitation  
Gender  
Hygiene (or health) education  
Indigenous Technical Knowledge  
Integrated water resources management  
International water law  
Knowledge, Attitude and Practice (KAP) studies  
Marginal cost pricing  
Metering  
Monitoring Indicators  
Non-governmental organisations  
Participation  
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Participatory Technology Development  
Policy Review  
'Polluter pays' principle  
Private sector participation  
Ramsar Convention  
Regulatory systems  
Re-use and recycling of water  
River Basin Organisations  
Social data collection  
Social Impact Assessment  
Stakeholders  
Social mobilisation  
Subsidiarity principle  
Tariffs  
Tariff structures  
Transboundary waters  
Virtual water  
Water-borne diseases  
Water laws and legislation  
Water markets  
Water ownership  
Water quality standards  
Water User Associations  
Willingness-to-pay surveys



**Appropriate modern technology:** The term 'appropriate technology' was originally often used interchangeably with 'intermediate technology' at a time when the over-sophistication of technology used in many development projects was a major problem and led to their failure. It has therefore often been wrongly applied to mean technology of an unsophisticated kind. However, the key concept is that technology should be 'appropriate' in all senses – managerially, economically, socially, environmentally; this may mean that it should not be highly sophisticated, but not necessarily. In addition, there have been a number of technical advances and introductions of cost-cutting materials in low-level technology in recent years – in the cases, for example, of handpumps, tubewell casing and latrine parts. And certain apparently low-level technologies – solar power, for example – are technically complicated and require high levels of precision. Therefore, the term 'appropriate modern technology' captures all elements and can be used to ensure no confusion with low-level or intermediate technology, or technology which is not up-to-date.

**Awareness raising:** Awareness raising or awareness building is the objective of information, education and communications activity, usually directed at the intended beneficiaries of services but also at other stakeholders, including politicians, government officials, and private companies. Identifying awareness raising as a specific activity of programmes and projects underlines the fact that a certain level of awareness – about the nature of services, the costs of services, the need to protect water after the point of collection, the need for hygienic use of water to control disease, and about many other aspects of water-related schemes – cannot be taken for granted among potential service users. Awareness of the relevant issues is

necessary for effective participation and community ownership of schemes, for developing support for service charges and systems of tariff collection, and for introducing mechanisms for environmental protection. Awareness raising is needed to close the gap between the expectations of donors and project managers, and those of beneficiaries, especially among undereducated populations, and cannot be left to chance. *See also Communications techniques.*

**Basic needs/Basic services:** The concept of meeting 'basic needs' was developed in the 1970s and internationally adopted to supplement economic growth as the primary target of development co-operation. Previously, the assumption had been that the fruits of economic growth would automatically 'trickle down' to the poor, but re-assessments in the late 1960s showed that the poor were typically gaining little from – relatively successful – economic growth policies, and were in many cases becoming further marginalised. The meeting of basic needs for food, water, shelter, health care and education thus became the driving force of the second and third UN Development Decades (1970s and 1980s). The concept of 'basic services' was developed as the strategy for meeting 'basic needs', initially in health care and water supplies; later in sanitation, household food security and education. Critical components of the 'basic services strategy' included low-cost, appropriate technology approaches; and the recruitment and training of the community-based worker (under many different designations) at the frontline of service extension. This person, male and female, acts as a link between services and communities, sometimes as a para-professional employee or volunteer, and often as a proselytiser for the benefits of services and their proper use. He or she may also



collect levies for service maintenance and use. The concept of 'basic services' therefore not only conveys the idea of a minimal level of service to meet 'basic needs', but their facilitation via support to community mechanisms. (*See also Participation.*)


**Beijing Global Platform for Action:** The Beijing Global Platform is a product of the UN Conference on Women in Beijing in 1995 designed to promote women's rights and gender equality in development. It sets out policies and practices, which local authorities and other decision makers have been directed by governments to fulfil, and which organisations can use to support their gender-related work. The Platform identifies 12 'critical areas of concern': poverty, education and training, health, violence against women, armed conflict, the economy, power and decision-making, institutional mechanisms, human rights, media, environment and the girl child. The Platform defines strategic objectives and spells out a series of actions to be taken over the next five years by governments, the international community, non-governmental organisations and the private sector, to eliminate discrimination against women and to remove all obstacles to their equality.

**Capacity building:** 'Capacity building' is the term used to describe the necessary process of institutional expansion, improvement or reform which facilitates the effective operation of programmes or services. The process should be continuous, and applies as much to formal bodies as informal bodies, such as local community groups. The concept of capacity building has become very prominent in development thinking during the recent past. (*See Chapter 13 for a description of methods of capacity building.*)

**Clean technology:** Technology used today must respect environmental sustainability. This means designing systems so that as little waste and as few emissions as possible are produced. 'Clean technology' is a holistic approach to technology. It may mean switching to a more environmentally benign production method, or the introduction of a system which reduces waste output. A key objective in water-related contexts is to minimise both consumption and waste throughout the whole process of water supply and sewerage delivery, transport and treatment, without compromise to public health. For example, volumes of water used in flushing can be minimised: it is unsustainable to use environmentally and economically expensive clean, treated water as a medium for the transport of domestic and industrial waste. This waste, as well as sullage (or grey water) can be seen as a resource. By utilising sullage for irrigation, for example, the volumes of mixed waste entering a plant can be reduced, therefore minimising the energy and chemicals used in water treatment.

*Further information: Clean Technology – An Introduction*, Journal of Chemical Technology and Biotechnology, 1995.

**Communications techniques:** Establishing good communications channels between key stakeholders – notably project staff, officials, local communities and beneficiaries – is an important part of project planning. Without good communications, the participatory process is likely to remain cosmetic and ineffective. Many techniques have been developed for eliciting and exchanging information between stakeholders, especially between project staff and beneficiary populations and user groups, and are described in the literature on participatory appraisal (see below). Low-income, illiterate or marginalised groups



may feel inhibited in face-to-face contact with outsiders and these techniques are designed to overcome such problems. Communications aids such as flip-charts, cue-cards, visualisation of problems, videos and cartoons, may be needed. NGOs, educators, and communications experts with the relevant experience need to be involved in the development of such aids and their application. More distant communications channels such as radio and television can also be used, but active participation requires face-to-face communications. *Further information: Communication strategies for heightening awareness of water, UNESCO, 1987. Communication in Water Supply and Sanitation – a Resource Booklet. IRC, 1993.*

**Decentralised co-operation:**

Decentralised co-operation is the term used by the EC to describe various funding mechanisms for developing projects with, and implementing them through, partners other than governmental agencies, including local authorities, universities and NGOs. (See Chapter 14 for a full description.)

**Demand management:** Demand management (DM) of water resources is the alternative to supply augmentation, the prevailing policy in many countries until recently. In countries or regions facing implacable hydrological limits, DM recognises water scarcity as a fact of life and creates the conditions in which users can appreciate its real value. By making better use of the resource, DM obviates the need for costly new investments, and avoids the environmental disturbance inherent in many new supply schemes. DM has various themes: losses and waste reduction, economy in use, the development of water-efficient methods and appliances, creation of incentives for more careful use of the resource,

improved cost recovery, reallocation from low- to high-value uses, devolving responsibility from central government, greater use of economic instruments (prices and markets). DM typically includes measures to relate the value of water to the cost of its provision, and thereby motivate consumers to adjust their usage. DM entails treating water more like an economic resource, as opposed to an automatic public service. Introducing DM involves action at three, mutually reinforcing, levels: creating enabling conditions through government policies; specific incentives for water users; and the implementation of projects and programmes in such areas as leak detection, canal lining, and wastewater recycling. *Further information: Managing Water as an Economic Resource, ODI, 1991. Water: Economics, Management and Demand. ICID, 1997.*

**Economic and financial analysis:**

Financial analysis is undertaken to determine a budget for the project, as well as the intrinsic (before financing) and financial (after financing) value of a project, for individual economic entities or a group of entities. It is a very useful tool to verify the 'affordability' of water for the poorest groups. Economic analysis broadens the perspective to national scale and allows assessment of the relevance, effectiveness, efficiency and viability of the project. However, as it cannot always give a full picture of the factors affecting a given project, it should not be used as a sole criterion for making decisions, but used in combination with other analyses (see Chapter 13 for a fuller description).

**Ecosystem management:**

The ecosystem is the ecological framework within which flora and fauna exist and thrive. The aquatic ecosystem covers the components of the hydrological system: lakes, rivers, streams and wetlands, but




is defined also by floodplains, catchments and estuaries which constitute complex and interrelated hydrological systems. Each of these components function in a larger ecological landscape influenced by the other components of the hydrological cycle including adjacent terrestrial systems. Management of the ecosystem involves ensuring that flora and fauna exist in harmony with their environment. Changes to the ecosystem occurring naturally are usually slow to make an impact. Man-made changes can upset the balance of the ecosystem and cause it to be unstable. Damage may be irreversible, long-lasting and cause further negative effects. Ecosystem management principles require that changes made to the aquatic environment are environmentally sensitive and will not have an adverse impact on other components or the entire ecosystem. *Further information: Protection of water resources and aquatic ecosystems, UN Economic Commission for Europe, 1993.*

**Environmental analysis:** Various forms of environmental analysis can be used to identify the potential environmental impacts of a project. In cases where the environmental impact is likely to be significant due to the size and type of the project, a full Environmental Impact Assessment can be undertaken. Methodologies are explored in *Chapter 13 under Environmental Procedures.*

**Environmental economic valuation:** The three main approaches to valuing environmental impacts are: using market prices for the physical effects of environmental change

on production; the use of stated preferences (what people say their environmental values are); various kinds of revealed preferences (inferences drawn from peoples' actual behaviour). (*See Chapter 13, Environmental economic valuation.*)

**Environmental sanitation:** Environmental sanitation aims to achieve safe, non-polluting human waste disposal in rural and urban areas, recognising that the nature of sanitation systems has important implications for the quality and safety of the environment as a whole. In many crowded areas where waste disposal presents a health and convenience problem of significant proportions, sewerage is impracticable for cost reasons; its heavy use of water for flushing and the level of contamination it can introduce into waterways also renders it undesirable and costly from an environmental perspective. Over-dependence on 'flush and discharge' for human waste disposal in an era of increasing water scarcity has led to calls for an 'ecological' approach to sanitation, in which solid wastes and liquid wastes are separately disposed and water for flushing used sparingly if at all. The thrust of environmental sanitation is that on-site disposal via latrines is the preferred system for low-income areas. Many latrine systems also have the advantage that their stored waste contents can over time be used as nutrients for food production; in rural areas they can be used directly by householders, and in urban areas, sold as a fertiliser product for income-generation purposes. However, latrines – especially cheaper models – can be poorly



constructed and insanitary, failing to confine waste adequately to prevent contamination of surrounding soil and groundwater and presenting a health hazard at times of seasonal flood. To overcome these problems and others associated with insufficient attention to the environmental implications of sanitation systems, more research is needed both into low-cost and higher-cost technologies and into methods of recycling and treatment. *Further information: Ecological Alternatives in Sanitation*, SIDA, 1997; *Sanitation Promotion Kit*, WHO, 1997.

**Gender:** Since the UN Decade for Women (1980–1990), women's multiple roles in development have been much more widely appreciated. Women used to be seen primarily as beneficiaries, especially of social services such as maternal and child health and domestic water supplies; today their role as actors, both in terms of their contribution to the household and community economy, and as domestic and community managers, is also appreciated. In the past, women's development activities were seen as separate from the mainstream. Once it was recognised that they are actors in all development activities, a word was needed which would enable development planners to take into account special issues arising from women's and men's different social as compared to biological roles; hence the use of 'gender' for this purpose. A 'gendered' approach is one in which the different roles and viewpoints of women and men have been identified. The impact of any intervention on men as well as on women has to be assessed, but the reality is that women generally have less access than men to land, training, education, employment, leisure opportunities, and political power. Gender analysis allows planners

to identify existing disparities, with a view to helping correct them or at least to avoid reinforcing them. (*See also Gender Analysis in Chapter 13.*)

**Hygiene (or health) education:** It is nowadays regarded as axiomatic that public health benefits are unlikely to be gained from basic water supply and sanitation service schemes in low-income communities unless their installation is accompanied by programmes of hygiene or health education. This is one of the critical items of 'software' in BWSS now given emphasis alongside appropriate 'hardware'. Experience has shown that (a) a water supply may be an important felt need among communities, but for survival, convenience, and burden-reduction reasons, not for protection of family health; (b) the germ theory of disease and the threat posed by pathogens are not well-understood among uneducated populations; (c) low-income communities frequently ignore the need for safe waste disposal as a health protection measure; (d) as a result of insanitary storage practices, lack of hand-washing, and poor excreta disposal, water which was safe at the point of collection frequently becomes contaminated. Hygiene education is needed to correct this situation. Agents and organisations suitable for the delivery of hygiene education include health department workers, sanitation officers, NGOs, and teachers. There is extensive experience with good hygiene education programmes (including school health education) which can be called upon. *Further information: Stir Gently! The Way to Mix Hygiene Education with Water Supply and Sanitation*, IRC, 1994.

**Indigenous Technical Knowledge (ITK):** This term is used to describe the existing technical knowledge in local societies/cultures. ITK is particularly



important for basic water supply, sanitation and irrigation activities since it has been used since time immemorial in the following contexts: well-digging and management; gravity-fed ponds; irrigation works; control of seasonal flows by terracing, diversion, dams, aqueducts, etc.; water-lifting. ITK often fulfils criteria of appropriateness and cost-effectiveness, and can be used as a basis for Participatory Technological Development (*see below*). However, development professionals, who may even develop parallel systems without realising that ITK systems exist, often ignore it. ITK is most effectively gathered by using participatory approaches and observation. Local people often do not know that a particular piece of local technology is unique, and they can also feel threatened by technology from outside. It is therefore important for them to understand that their technology is as valid as modern counterparts. *Further information: The Centre for Indigenous Knowledge on Agriculture and Rural Development*, Iowa State University, USA, and *The Leiden Ethno-systems and Development Programme (LEAD)*, Institute of Social and Cultural Studies, University of Leiden, Netherlands.

#### **Integrated water resources**


**management:** 'Integrated water resources management' (IWRM) expresses the idea that water resources should be managed in a holistic way, co-ordinating and integrating all aspects and functions of water extraction, water control and water-related service delivery so as to bring sustainable and equitable benefit to all those dependent on the resource. IWRM therefore takes account of: natural aspects of the water resources system (surface water, groundwater, water quality); water uses in all sectors of the economy and for all purposes, including consumptive (agriculture, industry, domestic) and

non-consumptive (ecosystems, hydropower, fisheries, recreation, navigation and flood control); the institutional framework for management of the resource; national objectives and constraints (social, legal, economic, financial, environmental); and the spatial variation of resources and demands (upstream-downstream, basin-wide usage, inter-basin transfer). IWRM implies a concerted attempt to moderate between competing or conflicting demands by users and stakeholders. Effective IWRM will therefore be a dynamic and interactive process involving consultation across sectors, a high level of communications activity, and an appropriate institutional, legal and financial framework. The EU recognises the importance of IWRM in its Water Resources Framework Directive.

**International water law:** In 1997, the UN General Assembly adopted a Convention on the Law of the Non-navigable Uses of International Watercourses aimed at guiding states in negotiating agreements on specific watercourses, and invited member states and regional economic integration organisations to become parties. This is the most recent body of international legislation for negotiation and conflict resolution concerning transboundary waters. (*See a fuller description of international legal instruments in Chapter 13.*)

#### **Knowledge, Attitude and Practice**

**(KAP) studies:** KAP studies are used to establish existing knowledge, attitudes and practice vis à vis basic health and hygiene, including those which relate to water and sanitation. These studies may be critical to reaching an understanding of whether underprivileged communities appreciate the connection between water, excreta, germs and disease, and what existing beliefs and



behaviours need to be changed in order for provision of services to lead to health impacts. If the principal values attached to water are spiritual, or have to do with temperature or taste, a new and safe source may not necessarily be valued. KAP studies have often shown that convenience, and savings of women's time and energy, are rated much more highly than health benefits. KAP also has an influence on quantity of water used in the household, types of use, and other health-related water behaviours. Methodology for KAP studies is available in the social survey literature. (*See also Social data collection.*)

**Marginal cost pricing:** 'Marginal cost pricing' expresses the theory that the net benefits of an economic activity are maximised when prices are equal to the marginal cost of production. This is because prices measure consumers' marginal willingness to pay, and therefore the value, of a commodity or service. The marginal cost is the quantity of resources, which must be employed to produce a single extra unit of the commodity. When price equals marginal cost, it indicates that the cost of the marginal unit of production is just equal to, and therefore justified by, the value of the extra consumption. In the case of water resources, the 'cost of production' should be interpreted to include the impact on the environment. Damage to the environment can lower welfare directly (e.g. through reduced amenity), or indirectly, through the need to spend more on water treatment. Also, any current use must reduce the amount of water available for use in future periods. This would apply to any store of water, such as an aquifer or lake, being used in excess of its recharge rate. Continued exploitation must at some time lead to exhaustion. Hence, current use of the resource has an opportunity cost which is the cost of use foregone in the future. Various formulae exist on which marginal cost pricing policies can

be based, which take into account the indivisibilities, which are a feature of water resources, investment. *Further information: Pricing of Water Services.* OECD, 1987.

**Metering:** Systems of metering for calculating water consumption, and thereby charges owed by the customer per unit of water consumed, are needed in cases where charges or tariffs for water are not set at a flat rate per user. However, it is important to recognise that metering is expensive to install and operate efficiently, and that users are likely to reduce their usage, so that it may not be economic – however apparently desirable – to install a metering system. Any decision to install metering will have to take many factors into account: the value and scarcity/abundance of water; the cost of installing meters, maintaining their security, staffing their inspection, billing customers, etc.; possible customer reactions; the desirability and practicalities of introducing a two-tier payment system, whereby above a certain level, price per unit increases, thus helping reduce waste and increase revenues. Most OECD countries, and a growing number of other countries, use metering for urban domestic water consumption. (*See also Tariff structures.*)

**Monitoring Indicators:** Monitoring is the systematic and continuous observation of actual events, and their comparison with the planned situation or outcome. Monitoring is necessary both to check the actual project performance on an ongoing basis, and to measure whether it has achieved the objectives it was designed for. In order for monitoring to be undertaken, indicators are needed about which data can be collected on a regular basis. The selection of useful indicators is critical to the quality of data collected. (*See also Chapter 13, Monitoring Indicators.*)



**Non-governmental organisations (NGOs):** This term is used to describe many sorts of organisations, whose only common characteristic is that they are separate from government, if not from its regulatory control. They are mainly voluntary agencies, charitable bodies, educational institutions, community-based interest groups and associations (professional, local, gender, etc.). Thus they are regarded as organised expressions of civil society, and are often suitable channels for development activity and funds. International NGOs have traditionally worked through local and indigenous NGOs as operational partners. The range of NGOs and their technical and managerial capacity is very wide. Many are primarily active in rural areas; some in low-income urban areas; some concentrate on project activity whereas others specialise in advocacy and awareness raising. In recent years, strengthening the capacity of local NGOs has been seen as a means of fostering development and the institutions of civil society, which has a developmental purpose in itself. In some countries, where government service infrastructures are underdeveloped, NGOs have become an alternative or additional conduit to government for development co-operation funds from governmental and multilateral donors. Their role has accordingly been given greater recognition, and has at the same time come under greater scrutiny and regulation by recipient governments. As far as water-related activity is concerned, they are most likely to act as partners with local authorities in the context of BWSS. Their focus on the poor, and their emphasis on participation, favours their involvement at community level. (*See also Decentralised co-operation and Chapter 14.*)

**Participation:** Although the concept of 'popular participation in development' is far from new, realisation has grown during the recent past that

'participation' must be organised in such a way that it leads to popular involvement in decision-making, not simply in making voluntary contributions of time, effort or payment. Thus, today, participation is understood to mean a process by which people share in decisions relating to policies and actions undertaken by formal bodies on their behalf, and by which they accept responsibility for those decisions. A participatory approach is often one which leads to project beneficiaries becoming actors or managers within a service delivery scheme: in BWSS, as handpump caretakers, for example, or as latrine manufacturers and installers. Basic services schemes usually include the establishment of local Water Committees, with responsibilities for community involvement and contributions. A local community-based worker, voluntary or modestly paid, frequently acts as go-between between service providers and consumers as a strategy for fostering participation (*see also Basic Services*). From the perspective of senior project managers and government agencies, the benefits of participation are that stakeholders have a sense of ownership of the project, are motivated to take an active part in project activities, and their contributions may keep cost low and ensure services are wanted, used properly and maintained. The participation by women as well as men at all levels is regarded as essential. (*See also Gender, Participatory Appraisal and Stakeholders.*)

**Participatory Appraisal:** Participatory appraisal (often known as PRA because its origins were in rural appraisal) is a process of gathering information in which people are involved in the collection of information about their own communities. This allows them to become actively involved in the analytical process concerning actual or




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proposed interventions, mobilising stakeholders and collectively identifying and prioritising problems and actions to resolve them. Typically the method relies on verbal communication and often incorporates techniques such as structured interviews, focus groups, and mapping. (See Chapter 13 for a description of methodologies.)

### **Participatory Irrigation Management**

**(PIM):** Participatory irrigation management denotes a system of managing irrigation schemes which involves users in all aspects of their development and operation. The principle of participation in irrigation was introduced in the recognition that scheme design and management was not sufficiently responsive to local conditions and needs. Other more pragmatic incentives include the poor performance of many public sector agencies and the drive to reduce government expenditure on operation and maintenance. (See Chapter 13 for a fuller account of different approaches to PIM.)

### **Participatory Technology**

**Development (PTD):** PTD focuses on technology development appropriate to the needs, interests and skills of the users, usually starting from technology with which they are already familiar and competent. The purpose of PTD is to enable users to maintain a sense of control and ownership of technology, to provide them with information about the options available to them and the knowledge to assess alternatives. PTD utilises indigenous knowledge – the local knowledge that is unique to a given culture or society. Indigenous knowledge has a value in its own right, enjoys high credibility locally, is not dependent on a high level of education, and has its own channels of dissemination. By taking time and effort to document local knowledge, it becomes accessible to those trying to

introduce change. A relationship based on understanding and respect helps to establish a sound basis for participatory approaches.

**Policy Review:** A Water Policy Review is likely to be an important part of the PCM programming phase. In many countries, no existing machinery exists for a Policy Review at the national level; the task may therefore have to be undertaken by consultants, whose brief might include the setting up of a system which can subsequently be used in-country. The Policy Review should assess existing policy, its objectives, the status of water resources, the capacity and effectiveness of institutional mechanisms involved in their management and deployment, and potential sources of investment; and it should generate a matrix of problems and critical issues, including potential or actual conflicts between different water users. The review is likely to produce new goals and policies on which a detailed strategy can be based. This strategy, for application at national and sub-national levels, should be developed in tandem with any new policy to make sure that policy decisions are realistic.

*Further information: Water Sector Policy Review and Strategy Formulation, FAO, 1995.*

**'Polluter pays' principle:** The 'Polluter Pays' principle is based on an economic approach to pollution control designed to ensure that the polluter bears the cost of the pollution damage and/or the costs incurred in controlling the pollution – otherwise known as the abatement costs. The OECD describes it as 'the principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment'. Accordingly, 'the polluter should bear the expenses of carrying out the above mentioned




measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the costs of these measures should be reflected in the cost of goods and services, which cause pollution in production and/or consumption.'

**Private sector participation:** The participation of the private sector in delivery of water supplies, irrigation and wastewater services has attracted much attention as a solution to systemic problems of service delivery. The basis for its advocacy is the recognition that private commercial companies tend to operate services with greater efficiency and less waste than government-run utilities, while managing to recover their costs. The level of development and the suitability of private sector institutions in different settings will strongly influence the form of public-private partnerships. Options are wide-ranging, from minimum private sector involvement, which could consist of contracting out the management of certain major installations; to full divestiture to autonomous water companies of responsibility for capital investment, operations, and commercial risk. (See Chapter 13, *Public-private partnerships*.)

**Ramsar Convention:** The Convention on Wetlands, adopted in Ramsar, Iran, in 1971 and since known as the Ramsar Convention, came into force in 1975. It was the first of the modern global intergovernmental treaties designed to protect the environment and preserve natural resources. The Convention's mission, which was re-stated in 1996, is the conservation and the wise use of wetlands by national and international co-operation as a means of achieving sustainable development throughout the world. As of January 1998, 106 states had become Contracting Parties. Membership in the Ramsar Convention

entails an endorsement of the principles that the Convention represents, facilitating the development of national policies and actions, including legislation, to make best possible use of their wetland resources. Contracting Parties are committed to designating at least one site meeting Ramsar criteria for inclusion on the list of wetlands of international importance; including wetland conservation within national land-use planning; establishing nature reserves; and consulting with other parties about the implementation of the Convention, especially with regard to transboundary wetlands. The administration of the Convention is entrusted to a secretariat at the IUCN – the World Conservation Union in Switzerland.

**Regulatory systems:** Regulatory systems are needed to monitor and enforce established laws, agreements, rules and standards (see also *Water laws and legislation*). These cover such matters as the administration of water rights and allocations; standards of service; water quality; environmental protection; and prices and tariffs charged by regulated utilities. In many countries the regulatory functions are inadequately performed and spread inconsistently between agencies; this is an increasingly serious deficiency where service delivery or operational functions are being decentralised or devolved to the private sector. Too often, regulatory bodies are established, but the resources, human and financial, are not made available to permit effectiveness. They need to be able to: develop data collection strategies; define regulatory policy and enforcement measures; define methodologies for monitoring; take effective action on breaches of standards; and act as arbitrator in conflicts of interest. Legislation is needed to ensure that regulations are co-



ordinated and enforced. *Further information: Water Resources Management: A World Bank Policy Paper*, World Bank, 1993.

**Re-use and recycling of water:**

Freshwater scarcity is now a major issue in many areas of the world. Additional sources of water are therefore required – especially for agriculture, which is a major water user. The re-use or recycling of drainage water, wastewater, brackish water or polluted groundwater can be economically and environmentally beneficial and practicable in many settings. However, these water sources require careful management. The two main re-use techniques are: blending (normally for drainage water) which involves the mixing of marginal quality water with good quality water to reduce the concentration of pollutants; and treatment which involves either high-cost treatment works or low-cost robust systems such as constructed wetlands, soil aquifer systems or stabilisation ponds to remove pathogens and undesirable trace elements. Stabilisation ponds can achieve water of good enough quality to use for unrestricted irrigation based on WHO (1973) Guidelines. The re-use of drainage water for irrigation is already extensively practised in Egypt, Pakistan and USA. The re-use or recycling of water for domestic purposes will increase as low-cost techniques for treating water become more widespread. *Further information: The safe use of marginal quality water in agriculture: a guide for the water resource planner*, HR Wallingford, 1997. *Water quality for agriculture*, FAO, 1989.

**River Basin Organisations (RBOs):** The river basin as a planning and management unit for water resources has been seen as a means of developing

an integrated approach. Its closed geographic boundary system permits various sectors and users in a basin to work together: agriculture, flood control, industry, settlements, communities, etc. Since these water uses fall under the aegis of different administrative departments, a survey is needed to identify those present in the basin, their various roles and capacities, and how they will inter-relate, before an RBO can be established. RBOs have proved their worth in the following areas: watershed management including erosion control; data collection and storage for surface water flows; land-use planning and flood risk prevention; the facilitation of demand management decisions based on a comprehensive understanding of the uses of water and their relative values within the basin; co-ordination between the various sectoral authorities present in the basin and with stakeholders. Shortcomings include the fact that hydraulic boundaries do not match aquifer boundaries and water table over-exploitation and pollution of groundwater can easily be neglected. To be effective, an RBO should have its own capacity to manage and regulate water resources and also to invest in studies, monitoring and research; it therefore needs an adequate budget. (*See also Transboundary waters.*)

**Social data collection:** This term is self-explanatory; the recent past has seen a growing emphasis on social data collection given that many development projects have failed because they have been 'rejected' or simply not perceived as beneficial and therefore ignored by those they were intended to benefit. Social data is likely to fall within the following parameters: before and after an intervention; over time; comparing like with like; measuring increase or decrease. Methods of collecting data



which reflect the real needs and attitudes of local people include participatory rural appraisal (PRA) (*see above*), rapid rural appraisal (RRA), and Knowledge Attitude and Practice (KAP) studies (*see above*). All these are covered in the literature on social survey methodology.


**Social Impact Assessment (SIA):** Social Impact Assessment is a method of finding out how a community or set of communities are likely to experience the intended outcomes of a project; and whether these are likely to affect their lives in such a way that they will reject the project, experience it either negatively or positively, and what level of ownership and responsibility for it can be anticipated. (*See Chapter 13 for a fuller description.*)

**Stakeholders:** A stakeholder is a person or a group of people who have a direct interest in the project because its existence will materially affect their lives. The interests of stakeholders will be established by dialogue with them, as will their attitudes and reactions to the project and the demands it may make upon them, and they are therefore crucial to the participation process. The identification of stakeholders through stakeholder analysis at an early stage is therefore essential (*see Chapter 13 for a fuller description*). Stakeholders may include: project beneficiaries; local people who are not beneficiaries; NGOs; community-based organisations such as women's groups; government departments and agencies; private producers and entrepreneurs; farmers' associations; fishermen; local artisans; industry; trades unions; professional associations (e.g. engineers); donors; consultants; councillors and other political representatives. It is important to include minority groups, low status

groups and the poorer groups in society. Stakeholder analysis is also used to assess the relationships between the project and all the actors. It can then be used as a basis for designing approaches to build on those relationships, where they are positive, or improve them where they are negative.

**Social mobilisation:** Social mobilisation is the term used to describe a planned effort to mobilise population groups, community and political leaders and other stakeholders behind a set of programme objectives and activities. A social mobilisation campaign could include a National Day (for example, for Sanitation) launched by the President or a top political leader. Groups within society, including NGOs, local administrators, schools, and government departments can be invited to undertake special activities up to and on the Day, and efforts made to ensure maximum media coverage. Social mobilisation can be a means of expanding communications channels and putting across messages about public health or environmental protection to a wide range of audiences. (*See also Communications techniques.*)

**Subsidiarity principle:** The principle of subsidiarity has been recognised as an internationally agreed principle governing water-related activity. As expressed in the Institutional and management principles in Chapter 2 of these Guidelines: 'Responsibilities for water-related services and resource management need to be decentralised to the lowest appropriate administrative level according to the concept of subsidiarity.' The intent of this principle is to discourage the perpetuation of centralised and hierarchical command structures in authorities responsible for water resource management. This type



of structure, while seen as disciplined and managerially accountable, tends to disallow participation by stakeholders in service delivery decision-making distant from the centre. However, the 'lowest appropriate administrative level' should not be a level without the resources, clout, or technical expertise to take informed and effective decisions. Subsidiarity must not be allowed to mean abandonment of responsibility, but rather encourage the mobilisation of resources and inputs at all levels, and capacity building to allow greater decentralisation of decision making on a progressive basis.

**Tariffs:** Tariffs or charges raise revenues for water services and are necessary for the operation and development of water supply and wastewater services. They also help to underline to users that water is a valuable resource. The most common kind of water charge is a flat-rate charge based on property values. The flat-rate charge has the benefits of certainty over the level of revenue and ease of administration and collection. Its major disadvantage is that charges are not related to the actual level of consumption. Thus this kind of charge cannot serve any economic purpose. Once the annual charge is paid, water becomes free, hence users have no incentive to restrain their consumption. The alternative to flat rate charges is volumetric charges, which vary according to the amount of water consumed (*see also Metering*). Most volumetric tariffs are of the two-part kind, with both fixed and varying elements. Some systems entitle the user to a free allowance of water for basic household needs, before volumetric charges begin to apply. Seasonal tariffs impose surcharges on water consumed at times of the year when it is scarcer and more costly to supply. In emergencies, such as drought, water may be rationed, or certain uses to be

prohibited. Different systems of tariffs are needed for irrigation; industrial water usage; and for waste and wastewater removal and treatment when this is not automatically coupled to water supply. *Further information: Pricing of Water Services*, OECD, 1987.

**Tariff structures:** The criteria for fixing the structure of tariffs are as follows: (1) The financial yield should enable the provider to cover the full costs of operating and maintaining water supply (and wastewater) services and meet capital costs where possible. (2) The tariff should reflect the cost of supplying each unit of water to the consumer, so that costs and benefits of the water can be equalised at the margin to ensure an 'efficient' allocation of resources. The tariff should also signal the relative costs of providing water to different classes of consumer, at different times and in different locations, so that uses with less social importance are charged at higher levels than those with more. (3) The tariff system should be seen to be 'fair'. It must bear some relationship to ability to pay – poor consumers should receive special consideration. But fairness also implies some link between payments and the amount of water consumed. (4) It is in the public interest that every urban household should use enough water for personal hygiene, food washing and preparation, and for toilets. Thus there are important public health reasons to ensure that services are used and the tariff should not discourage this consumption. However, nor should it encourage waste. (5) The tariff should attempt to internalise the environmental costs entailed in water supply, treatment and disposal. (6) The charging system should be easy for the customer to understand and for the authorities to defend. It should not



impose heavy administrative costs nor keep changing. This criterion is likely to run counter to some of the others listed above.

**Transboundary waters:** The waters of a number of major rivers are shared between two or more countries in the developing world. In some cases, notably in the Indian sub-continent, the geographical basin includes not only more than one single national territory, but several autonomous states within one of the countries. Although the idea of the international river basin organisations (RBOs) enjoys the support of international organisations, particularly UN bodies, it has so far been greeted with only modest success. This is not surprising since a high degree of common purpose is required to reach agreement over the sharing of the waters of large international rivers. However, since this is a potential cause of conflict, notably in the Middle East, efforts to bring the various countries and states together to plan water resources development on a mutually agreed basis clearly need to be emphasised. An organisation – the International Network of River Basin Organisations (INBO) – exists to promote such mechanisms, which can become a catalyst for inter-state co-operation. (*See also River Basin Organisations, and Chapter 13, National and International Water Law.*)

**Virtual water:** ‘Virtual water’ is the non-evident water embedded in water intensive commodities such as food crops. A tonne of wheat, for example, requires 1,000 tonnes of water over 100-150 days in order to reach maturity. ‘Virtual water’, if factored into the national water balance sheet, can be the most economically significant form of water in water-short (arid) countries. Rather than use valuable supplies of freshwater for producing crops such as

wheat (whose price in real terms has been falling over time), a country can, by importing food, effectively import water. Thus, integrating ‘virtual water’ into economic and environmental assessments of the agricultural resource base may permit the reduction of water deficits. Around 95 million tonnes of wheat entered world trade in the mid-1990s, reflecting a ‘water-trade’ of at least 95 cubic kilometres of ‘virtual water’ annually. The Middle East and North Africa economies imported about 40 cubic kilometres of ‘virtual water’ annually in cereals in the mid-1990s. *Further information: Water Policy: allocation and management in practice*, E & FN Spon/Chapman and Hall, 1996.

**Water-borne diseases:** The term ‘water-borne disease’ is often used loosely, to describe all diseases carried by water. Strictly, water-borne diseases are those in which the infectious agent is itself carried by water: diarrhoeal diseases including typhoid, cholera and dysentery; and infectious hepatitis. Other diseases are **water-washed**: skin diseases such as yaws, scabies, leprosy; eye diseases such as trachoma; or **water-related**, in which case the disease is spread via an organism living in water, such as schistosomiasis (via snails) and guinea-worm; they may be insect related, in which case they are spread by an insect that breeds in water or bites near it, such as sleeping sickness (tsetse fly), malaria and yellow fever (mosquito), river blindness (blackfly). Other diseases are spread by poor sanitation; pathogens in human excreta remain exposed or are washed into waterways. These include all diarrhoeal diseases and parasites such as hookworm and roundworm. Many factors in basic water supplies and sanitation projects and irrigation schemes need to take disease control into account. *Further information*, consult WHO and UNICEF;



also ***Guidelines for Forecasting the Vector-borne Disease Implications of Water Resources Development***, WHO, 1991.

**Water laws and legislation:** Laws and regulations provide the framework within which water-related policies are put into effect. However, in many developing countries capacity shortfalls mean that it is difficult to enforce elaborate legislation, so that laws relating to water need to take this into account. Among their key purposes are protection of public health, protection of natural resources, and prevention of unfair pricing. Legal instruments provide the mechanism for translating policy into practical implementation. Rules, regulations and standards provide the authority for management and enforcement agencies. They facilitate cross-sectoral actions, provide mechanisms for conflict recognition and resolution of competing interests. Effective regulatory systems are particularly essential for decentralised management, where standards may slip and irregularities occur. The major issues in framing water legislation include ownership of the resource, rights of usage and authority to regulate. Water law is also closely linked to land use in many countries. (*See also Regulation and Water ownership; and Chapter 13.*) **Further information:** ***Water Resources Institutions***, World Bank, 1992.

**Water Markets:** The aim of water markets is to encourage existing water supplies to be used more efficiently, by allowing users to sell their water rights to other consumers. Water markets tend to be preferred by farmers to volumetric charges for irrigation water. All water, not just that which is surplus to the farmer's use, becomes potentially marketable, and farmers have an incentive to drop low-value applications if they can earn more by selling it

('water farming'). Water markets have other advantages: (1) They recognise traditional water rights, capitalised in the value of land. Farmers become allies in the transfer of water to other users. (2) They remove the need for large financial subsidies for building and operating irrigation systems, which usually benefit wealthier farmers. (3) They offer flexibility in responding to changes in crop prices and water values. The development of efficient water markets depends on a number of conditions, including the ability of the seller to establish ownership over the resource at law, which means that customary rights may be insufficient as a basis for a deal. In addition, for markets to operate in the public interest, the interests of third parties including environmental interests and those of populations living downstream of any large transfer need to be considered. **Further information** (*this mainly relates to Australia and New Zealand where considerable work has been done on water markets*): ***Water allocations and entitlements: a national framework for the implementation of property rights in water***, COAG, 1995.

**Water ownership:** It is important to distinguish between ownership of water, and the right to have access to water and use it. Regulation of the resource can only arise out of an authority, explicit or implicit, that the government has the right to manage the resource in the public good. Most governments expressly own water, and the protection of the resource is therefore a public function to which individual rights are subservient. The right to use water is based either on customary or statutory claims. In order to be regulated, these must be clearly identified. Customary rights may include the right to expropriate, use or trade water, on which can be built systems of community ownership or use and water



charges. While building upon existing systems is often the surest and most acceptable route to implementation, systems based only on customary rights may not be able to assure efficient and equitable allocation of a scarce resource. A system of water law needs not only mechanisms of ensuring access to water (water rights) but also a system of obligations regarding usage and control of the levying of water charges by individuals (restriction of rights).

**Water quality standards:** Whether water quality is satisfactory will depend on its intended use (e.g. drinking, other domestic usage such as bathing, irrigation, industrial use). Factors such as scarcity will also affect the quality standards applied. Setting these standards, which should be enshrined in law, is the responsibility of the government regulatory authority regarding water in the country or state concerned; WHO has issued international guidelines to facilitate this process although they can be demanding. Some variables are critical to human health and should be checked whatever the level of service; for example, for drinking water, *E. coli* and total coliform bacteria should not be detectable in any 100 ml sample. However, the high level of public health importance placed on water quality in municipal water and wastewater services may not be appropriate for basic water supply services. Studies have shown that water **quantity** often plays a more significant role than water **quality** in improving health and reducing morbidity from water-related disease in low-income communities. The time, energy and difficulty of water-hauling means that, typically, very little water is used in the household for any purpose, and this coupled with inadequate means of excreta disposal has a greater impact on health than lack of safe water. In addition, water often becomes

contaminated between the source of supply and its use (*see Hygiene education, above*). Thus, obtaining high standards of water quality in basic services schemes may be less important than making available a high volume per capita at a close distance to the home. Measuring water quality is a technical procedure; laboratories and suitable equipment will be needed. *Further information: WHO, Guidelines for drinking water quality, 1993.*

**Water User Associations:** Water User Associations normally comprise a formal, usually legally-bound, group of farmers (or water users), often grouped around a particular canal or borehole, with responsibility for managing and maintaining the part of the system that serves them. These Associations have come into existence as a result of governmental determination, often with donor support, to devolve some of the responsibility for the management and maintenance of irrigation (or domestic water and wastewater) services from central government onto users. Motivated by the search for efficiency and cost-savings, the creation of Water User Associations can be seen as a form of privatisation, with the government agency adopting the role of service provider rather than operator. Water User Associations can also be seen as a means of community participation and community ownership of services. The degree of responsibility for the service and its maintenance varies from one model to another. In principle, their creation should lead to greater user commitment and reduced government intervention. To date, success with this approach towards devolution of services has varied considerably. *Further information: User Organisations for Sustainable Water Services, World Bank, 1997. Impacts of Irrigation Management Transfer: A review of the Evidence, IIMI, 1997.*



**Willingness-to-pay (WTP) surveys:** In recent years the planning of water services has been greatly assisted by the spread of market surveys of potential users. These surveys aim to uncover users' preferences for the proposed service, and what they would be willing to pay for it (hence the name, willingness-to-pay, or WTP surveys). These surveys provide a variety of information about householders' current sources of water; the volume of water used for different purposes; their

preferences about the proposed service; what they are now paying for water, and what they would be prepared to pay for a specified improvement; and whether they would connect up to a new supply source. These surveys are equally applicable for sanitation and sewerage. *(For a fuller description see Chapter 13).*